utrinque elevata submarginali notato, elytris fortiter seriatim punctatis. Long. ·07. Platte River, Nebraska Territory: covers itself with a casing of mud like the European species. The thorax is strongly margined, and has at the base near the lateral margin a little interrupted elevated line. In one specimen the the apex of the thorace is emarginate, but I can perceive no other difference.

Synopsis of the Eucnemides *of Temperate North America.*

By John L. Le Conte, M. D.

Although many entomologists consider that the small group of Coleopterous insects, herein treated, constitute a peculiar family, I am under the necessity, after very careful examination, of viewing them as a mere section of the extensive natural family of Elateridæ, and no more entitled to a distinct place in the series, than any other group of genera in that family.

The character which essentially distinguished the Elateridæ from allied families, as Erichson* has pointed out, is the looseness of the articulation between the pro-and meso-thorax. In order to allow of greater liberty of motion, the posterior margin of the inflxed portion of the prothorax is more or less dilated, or concave, so as to slide over the opposing part of the messothorax.

This character, although good in theory, is nevertheless sometimes difficult to be seen, and is less developed in the Eucnemides than in Typical Elaters: yet I have never failed to detect it, on close observation. In the genera Cebrio and Cerophytum it is completely wanting: the former recedes too in the prominent mandibles, and the latter in the posterior femora being inserted at the extremity of the elongate trochanter, instead of at its base and side, as in Elateridæ and most other Coleoptera. Although I have not yet detected the affinities of this difficult genus, I think there can be no doubt of the propriety of entirely excluding it both from the Elateridæ and Cebrionidæ.

The Buprestidæ are distinguished from the Elateridæ by the posterior margin of the prothorax beneath, abutting directly against the mesothoracic segment. More distinct characters will be found in the union of the first and second inferior abdominal segments: the suture between them being visible only at the side: a character of great constancy is found in the form of the eyes, which are strongly transverse in all Buprestidæ, while they are generally round in all Elateridæ. In order to include the Eucnemides with the other more typical groups, the Elateridæ may be thus defined.

Coleoptera pentamera antennis serratis, mandibulis retractis, oculis rotundatis; prothorace inferne mesosternum superante; acetabulis anticis parvis rotundatis, in prosterno sitis, postice valde hiantibus: coxis posticis laminatis, trochanteribus simplicibus; abdomine 5-articulato, segmentis omnibus distinctis.

According to the form of the sternum and front, this family may be divided into several groups, of which the first and easiest, the Eucnemides, may be distinguished by the clypeus expanded in front of the antennæ; the labrum concealed: the head strongly deflexed: the prosternum not lobed in front. Our native genera may be arranged as follows:

A. Tarsi non laminiferi.

a. Thorax marginatus, subtus non sulcatus.

1. Palpi tenues, articulo ultimo vix crassiore.

Pedes fortiter compressi, (antennæ minus approximatæ) — Melasis Oliv.

Pedes tenues . . . . . — Tharops Lap.

2. Palpi articulo ultimo dilatato, (sæpius securiformi).

α. Caput sub oculis non sulcatum.

Laminæ tectrices magnæ intus sensim dilatatæ . . — Euryptychus.

Laminæ tectrices intus subsubito dilatatæ

tarsi articulo 4to simplici . . . . . — Epiphanis Esch.

tarsi articulo 4to subtus breviter lobato . . — Emathion Lap.

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* Germar's Zeitschrift für Entomol. 2, 179,

Laminæ tectrices intus quadrangulariter dilatatæ . ANELASTES Kirby.
β. Caput sub oculis valde sulcatum.
Laminæ tectrices angustæ . . . . . HYLOCHARES Latr.
b. Thorax marginatus, subtus ad latera sulcatus.
Antennæ tenues articulo 3^io sequentibus longiore . FORNAX Lap.
Antennæ tenues articulo 3^io non longiore . . . ISARTHRUS.
Antennæ valde serratæ vel pectinatæ . . . . . EUCNEMIS Ahrens.
c. Thorax margine interrupto, vel medio obsoleto.
Sulci antennales ad prosterni marginem siti, . . MICRORHAGUS Esch.
B. Tarsi subtus laminiferi.
Sulci antennales laterales - . . . . . GALBA Esch.

I am not sure that the primary division into genera with and without tarsal appendages is natural, but as I have had no opportunity of examining any genus of the latter division, I do not dare to disturb the arrangement adopted by all previous entomologists. From considerations derived from the study of other Elaters, I am inclined to think that it would be better to divide this portion (B) among those that precede it, putting Galba next to Eucnemis in (b.) and the foreign genus Pterotarsus before Microrhagus in (c.).

MELASIS Oliv.

1. M. pectinicornis Mels. Proc. Ac. Nat. Sc. 2,148. Pennsylvania, Melsheimer; Ohio, Schaum.

THAROPS Lap.

1. T. ruficornis. *Melasis ruficornis* Say, Journ. Acad. Nat. Sc. 3, 166: *Eucnemis* (*Nematodes*) *ruficornis* Say, Trans. Phil. Soc. 6, 187. Missouri; the elytra are yellow, with the posterior half black: sometimes they are entirely yellow. The antennæ of the male are strongly flabellate.

2. T. obliquus. *Eucnemis obliquus* Say, Trans. Am. Phil. Soc. 6,187. Ohio, Dr. Harris. My specimens are two fifths of an inch long, which is double the size mentioned by Say.

EURYPTYCHUS.

Clypeus ad apicem rotundatus: antennæ articulo 1mo elongato, 3^io præcedente longiore, 4—8 subæqualibus crassitie paulo longioribus, 9—10 latioribus, et triplo longioribus, 11 iterum longiore, elongato-ovali. Palpi articulo ultimo dilatato, triangulari; prosternum postice promineus, mesosternum profunde excavatum; tibiæ calcaribus apicalibus distinctis; tarsi tenues, articulo 1^mo elongato; laminæ tectrices coxarum posticarum intus gradatim valde dilatatæ, apice subacutæ.

The body is regularly arched, moderately wide for this family, and gradually narrowed behind the thorax: the thorax is much narrowed in front and rounded on the sides. The general aspect is precisely that of Ampedus.

1. E. heterocerus. *Eucnemis heterocerus* Say, Trans. Am. Phil. Soc. 6, 186. Pennsylvania, Messrs. Ziegler and Rathvon.

EPIPHANIS Esch.

The insect that I consider as belonging to this genus, differs from the preceding, in having the 3d joint of the antennæ scarcely elongated: the four terminal joints in the male are equally enlarged, and each is about twice as long as the 7th joint; the plates of the posterior coxæ are suddenly dilated within, and are broadly truncate at the extremity. I am unable to see the last joint of the palpi, which Eschscholtz describes as ovoid.

1. E. cristatus, nigro-piceus, griseo-pubescens, capite punctulato, fronte tenuiter cristata, thorace antrorsum angustato subtilius dense punctato, linea media vix distincta lævi, elytris parallelis punctatis, tenuissime striatis, antennis pedibusque rufo-piceis. Long. ·20. New York, one male specimen.

2. E. canaliculatus, nigro-piceus, griseo-pubescens, capite punctato, subtilissime carinato, thorace lateribus parallelis, ante medium rotundatis, con-

fertissime punctato distincte canaliculato, elytris parallelis, rugose punctatis, subtiliter striatis. Long. ·2. One female, Pennsylvania. Differs from the last by its coarser und denser punctuation, and by the thorax not being regularly narrowed in front.

3. E. cornutus Esch. Zool. Atlas. 1,10. tab. 4, fig. 6; Man. Bull. Mosc. 1843, 238. Sitkha: unknown to me.

Emathion Lap.

Sphærocephalus Esch.

This genus has a very great resemblance, to the last, and can only be distinguished by the slight inferior prolongation of the fourth tarsal joint, and by the prosternal prominence being acute. In the last genus this prolongation is blunt and rounded. The males of this genus have the 6 last joints of the antennæ a little enlarged.

1. E. atropos. *Eucnemis atropos* Say. Trans. Am. Phil. Soc. 6, 187. Louisiana, Schaum.

2. E. penetrans, elongatum cuneiforme, atrum confertissime punctatum subtilissime fulvo-pubescens, fronte linea tenuissima lævi, thorace latitudine sesqui longiore, lateribus parallelis antice rotundatis, pone medium late canaliculato, utrinque ante medium obsolete foveato; elytris tenuiter striatis, antennis pedibusque rufo-piceis. Long. ·22—·3.

Georgia: in Say's description of the preceding species, probably by a 'clerical' error, the terminal, instead of the penultimate joint of the tarsi is said to be dilated.

Anelastes Kirby.

1. A. Druryi Kirby. Trans. Lin. Soc. 12, tab. 21, fig. 2: Guérin Ann. Ent. Soc. Fr. 2d ser. 1, 17. *Silenus brunneus* Latr. An. Ent. 3, 129. Georgia.

Guérin refers this genus to the genuine Elateridæ: Erichson in Agassiz' Nomenclator Zoologicus places it in Cebrionidæ. The form of the clypeus, however, forces it into the present group. The prosternum is scarcely prominent behind; the plates of the posterior coxæ are suddenly dilated, by the addition of a quadrangular piece.

2. A. Latreillei, obscure rufo-piceus, subnitidus, thorace convexo, subtiliter parce granulato, postice canaliculato, lateribus valde rotundatis, angulis posticis divergentibus, elytris profunde striatis, interstitiis subtiliter rugose punctatis. Long. ·4—·5. Sacramento, California, Rathvon.

The thorax is much more rounded on the sides than in A. Druryi, and the whole surface is much less scabrous; the head is more distinctly granulated than the thorax, and the frontal line is faint as in the other species.

Hylochares Latr: Guér.

1. H. nigricornis. *Melasis nigricornis* Say Journ. Ac. Nat. Sc. 3, 165. Ohio, Schaum.

Fornax Lap.

Dirhagus Esch

1. F. bicolor. *Hylocharus? bicolor* Mels. Proc. Ac. Nat. Sc. 2, 149. New York: Wilcox.

2. F. badius. *Dirhagus badius* Mels. ibid. 2, 149. Pennsylvania, S. F. Baird.

3. F. cylindricollis. *Eucnemis cylindricollis* Say, Trans. Am. Phil. Soc. 6, 188. Illinois, Georgia, and Pennsylvania.

4. F. striatus, elongatus, ater pubescens, confertim punctatus, thorace latitudine longiore, lateribus leviter rotundatis, pone medium late canaliculato, elytris rugose-punctatis, striis sat profundis, interstitiis modice convexis, antennis tibiis tarsisque rufo-piceis, Long. ·22. One specimen, Georgia. Very similar to the preceding, but smaller, and with deep distinct elytral striæ.

ISARTHRUS.

Antennæ tenues, extus paulo incrassatæ, articulis cylindricis, 2—12 subæqualibus, 11mo paulo longiore. (Palpi invisi.) Thorax subtus ad marginem profunde sulcatus: coxarum posticarum laminæ tectrices intus modice dilatatæ, ad apicem late rotundatæ; tarsi tenues, articulo 1mo elongato, 2—4 gradatim brevioribus, 4to vix dilatato.

This genus differs from Fornax, by the third joint of the antennæ being not larger than the 2d or 4th; and by the posterior coxal plates being less dilated interiorly, and much more broadly rounded at apex: the fourth tarsal joint is less dilated.

1. I. spretus, elongatus utrinque obtusus, ater, breviter cinereo-pubescens, confertim subconfluenter punctatus, thorace convexo, antrorsum angustato, et rotundato, elytris striis tenuibus, interstitiis rugose punctatis, subconvexis, antennis pedibusque rufis. Long. ·2. Lake Superior. This is the *Fornax spretus* of my catalogue in Agassiz' Lake Superior.

EUCNEMIS Ahr.

a. *Antennæ serratæ: tarsi articulo 4to simplici.*

1. E. clypeatus Say, Trans. Am. Phil. Soc. 6, 189: *Elater clypeatus* Say, Ann. Lyc. 1, 266. Pennsylvania, Zimmerman.

b. *Antennæ serratæ: tarsi articulo 4to breviter lobato.*

2. E. amænicornis Say, Trans. Am. Phil. Soc. 6, 189. Southern and Middle States. The antennæ are subflabellate in both sexes: some specimens have the thorax a little rounded on the sides: these are probably females: the whole appearance is so similar to that of genuine Eucnemis, that I have not ventured to establish a separate genus upon the slight difference in the antennæ and tarsi.

MICRORHAGUS Esch.

1. M. imperfectus, elongatus, utrinque obtusus, ater pubescens, punctatus, capite canaliculato, thorace latitudine breviore, lateribus antice rotundatis, elytris tenuiter striatis, pedibus rufo-piceis, sulcis pectoralibus postice indistinctis. Long. ·22. New York, one female.

2. M. subsinuatus, elongatus vix cuneiformis, ater, supra obsolete pubescens, punctatus, thorace brevi, antrorsum subangustato, lateribus subsinuatis, angulis posticis explanatis, elytris rugose punctatis, obsolete striatis, tarsis testaceis. Long. ·2. Georgia, one male; similar to the next, but more than twice as large, and easily distinguished by the sinuosity of the sides of the thorax: it is also more coarsely punctured and less narrowed behind.

3. M. triangularis. *Elater triangularis* Say, Journ. Ac. Nat. Sc. 3, 170: *Eucnemis triangularis* Say, Trans. Am. Phil. Soc. 6, 189. Southern and Western States: the thorax is not at all narrowed in front; the anterior angles are a little rounded. It is singular that Guérin, (Ann. Ent. Soc. Fr. 1, 187,) should refer this species to Eucnemis, when Say expressly states the antennal groove to be near the middle of the pectus.

4. M. humeralis. Eucnemis humeralis, Say, Trans. Am. Phil. Soc. 6, 189. Pennsylvania, Dr. Melsheimer.

GALBA Esch.

1. G. (Dendrocharis) flavicornis Guérin. Ann. Ent. Soc. Fr. 2d ser. 1, 193. tab. 6, fig. 60, 61. Georgia; I have never seen this fine species.

The following species are unknown to me, and the genera to which they belong doubtful.

Eucnemis quadricollis Say, Trans. Am. Phil. Soc. 6, 186. Probably Melasis.

Eucnemis frontosus Say, ibid. Probably not of this group.

Eucnemis calceatus Say, ibid. The description of the antennæ agree perfectly with my Isarthrus spretus; but the 4th joint of the tarsi in that species is not lobed beneath.

Dirhagus rufipes Mels. Pr. Ac. Nat. Sc. 2, 150. The front is said to be longitudinally impressed, which is an unusual character in Fornax.

Eucnemis muscidus and unicolor, Say, Trans. Am. Phil. Soc. 6, 186. (*Elater m. & u.* An. Lyc. 1, 255,) are Perothops mucidus Erichson Germ. Zeitsch. 3, 117. The genus Perothops is of difficult location. It cannot be placed in the present group on account of its prominent, not inflexed mouth. From the typical Elaters it differs by its clypeus dilated in front, and concealing the labrum, and by the absence of an anterior lobe on the prosternum. It seems most natural to consider it as a special group connecting Anelastes among the Eucnemides, with the more typical Elaters.

[Note.—On p. 345 of the last number of this work, (Dec. 1851), the name puncticollis occurs twice in the genus Podabrus. The first of these (at the top of the page), should read Podabrus poricollis.]

The Committee on the Rev. Mr. Langstroth's paper on the "Impregnation of the Eggs of the Queen Bee," reported in favor of publication in the Proceedings.

On the Impregnation of the Eggs of the Queen Bee.

By Rev. Lorenzo L. Langstroth.

Many singular notions have prevailed respecting the generation of bees. Virgil* asserted that bees have no sexual intercourse, but gather young from the leaves of plants. New colonies, he thought, could be obtained from the carcasses of animals. Swammerdam, in his observations on bees, made in 1673, proved, by careful dissection, that the bee commonly called the King, is a female, and the mother of the whole colony, and that the drone is the male bee. He thought that a seminal atmosphere proceeded from the drones and caused the impregnation of the female, or as she is commonly called, the Queen.

Maraldi (1712) conjectured that the eggs of the Queen were fecundated by the drones after being laid in the cells. Arthur Dobbs (Philosophical Transactions, vol. 46 for 1760) was, I believe, the first who suggested that the Queen may have a sperma-theca, from the contents of which the eggs are impregnated. Debraw (Phil. Transac. vol. 67 for 1777) imagined that he saw drones depositing semen in cells containing eggs. Both Huber and Dr. John Hunter have shown that he was mistaken. The latter supports the theory of Dobbs, and endeavors to strengthen it by some curious experiments which he made on the impregnation of the eggs of the silk-worm. (Phil. Transac. vol. 82 for 1792.) Huber† (1788) was the first to demonstrate that the sexual union of the Queen and drone takes place when the insects are on the wing, in the open air; and that a Queen, when impregnated, will continue, at least for several years, to lay fertile eggs without any further intercourse with the male. He thought that she was impregnated for life, but he was not able even to conjecture how all the eggs in her ovary could be at once fecundated. Dzierzon, a German apiarian of great practical knowledge, has revived (1845) the notion of a permanently impregnated sperma-theca. He says that he has dissected Queen bees both before and after impregnation, and that he has found the seminal sac in the first case to contain a limpid fluid like water, and in the second case to be filled with a substance resembling the semen of the drone. This would seem almost to settle the question; but unfortunately he advances a conjecture which seems to be at variance with the idea that he had much skill in dissecting. He thinks that what is the poison sac in the worker becomes the sperma-theca sac in the

* Aristotle informs us that some cultivators called the rulers or kings, mothers, and the drones, males.

† Hattorf and Schirach (1770) believed that the Queen was self-impregnated; and the latter accounted for the existence of males by conjecturing that their semen formed the food of the young bee.